

SEQ GEN: A Comprehensive Multimission Sequencing System

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SEQ GEN is a user-interactive computer program used to plan and generate a sequence of commands for the spacecraft. Desired activities are specified by the user of SEQ GEN; SEQ GEN in turn expands these activities, deriving the spacecraft commands necessary to accomplish the desired activities. SEQ GEN models the effects on the spacecraft of the commands, predicting the state as a function of time, flagging any conflicts and rule violations. These states, conflicts, and violations are viewable both graphically and textually at the user's request. SEQ GEN also displays the entire sequence graphically, showing each requested activity as a bar on its graphical timeline. SEQ GEN includes a full-screen editor, allowing the user to make changes to the requested activities. After a change has been made to the sequence, SEQ GEN immediately revalidates the sequence, updating its models and calculations along with its displays based on these changes. Because SEQ GEN is user-interactive and because it has the ability to recalculate spacecraft states immediately, the user is able to perform "what if" sessions easily.

SEQ GEN, a multimission tool, is adaptable to any flight project. A flight project writes its adaptation files containing details of the project, including in its simplest form, only spacecraft commands. For more involved projects the adaptation files may also contain flight and mission rules, description of the spacecraft and ground models, and the definition of activities. SEQ GEN operates at whatever level of detail the adaptation files imply. Simple adaptations, the simplest being the specification of the spacecraft commands, are straightforward to do. **There is, however, no limit to the complexity of activity definitions or of spacecraft models; both may involve unlimited logical decision points.** Command and activities may involve any number of parameters of a wide variety of data types, including integer, float, time, boolean, and character strings.

SEQ GEN will be used by the MESUR and VIM (Voyager Interstellar Mission) projects in an effort to speed up adaptation time and to keep sequence generation cost down.

SEQ GEN is **hosted on** UNIX workstations. It uses MOTIF and X for windowing, and was designed and coded in an object-oriented style in the language C++.

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